In the Claims:

1-22. (Canceled)

23. (Currently Amended) A method of modifying the electrophysiological function of an excitable tissue region of an individual, the method comprising:

(a) providing cells expressing an exogenous polypeptide forming a functional ion channel or transporter; and

(b) implanting said cells into the excitable tissue region, such that each implanted cell forms:

(i) gap junctions with at least one cell of the excitable tissue region; and

(ii) a functional ion channel or transporter;

thereby modifying the electrophysiological function of the excitable tissue region,

wherein expression of said exogenous polypeptide is regulatable by an endogenous or an exogenous factor.

24. (Original) The method of claim 23, wherein said ion channel is selected from the group consisting of a sodium ion channel, a potassium ion channel, a calcium ion channel and a chloride ion channel.

25-27. (Canceled)

28. (Currently Amended) ~~The~~ A method of ~~claim 23,~~ modifying the electrophysiological function of an excitable tissue region of an individual, the method comprising:

(a) providing cells expressing an exogenous polypeptide forming a functional ion channel or transporter; and

(b) implanting said cells into the excitable tissue region, such that each implanted cell forms:

(i) gap junctions with at least one cell of the excitable tissue region; and

(ii) a functional ion channel or transporter;

thereby modifying the electrophysiological function of the excitable tissue region,

wherein an ion permeability of said functional ion channel or an activity of said transporter is regulatable by an endogenous or an exogenous factor.

29. (Currently Amended) ~~The~~ A method of ~~claim 23,~~ modifying the electrophysiological function of an excitable tissue region of an individual, the method comprising:

(a) providing cells expressing an exogenous polypeptide forming a functional ion channel or transporter;

(b) implanting said cells into the excitable tissue region, such that each implanted cell forms:

(i) gap junctions with at least one cell of the excitable tissue region; and

(ii) a functional ion channel or transporter; and

(c) ~~further comprising the step of~~ regulating permeability of said functional ion channel or an activity of said transporter to thereby regulate the electrophysiological function of the excitable tissue region.

30. (Currently Amended) The method of claim 29, wherein said ~~step of~~ regulating said permeability or said activity is effected by administering an exogenous factor to the excitable tissue region.

31. (Previously Presented) The method of claim 23, wherein each implanted cell forms said functional ion channel or transporter following induction.

32. (Currently Amended) The method of claim 23, wherein the excitable tissue region forms a part of an organ selected from the group consisting of a heart, a pancreas, a kidney, a brain, ~~a smooth muscle, a skeletal muscle~~ and a liver.

33. (Currently Amended) ~~The~~ method of ~~claim 23,~~ modifying the electrophysiological function of an excitable tissue region of an individual, the method comprising:

(a) providing cells expressing an exogenous polypeptide forming a functional ion channel or transporter; and

(b) implanting said cells into the excitable tissue region, such that each implanted cell forms:

(i) gap junctions with at least one cell of the excitable tissue region; and

(ii) a functional ion channel or transporter;

thereby modifying the electrophysiological function of the excitable tissue region,

wherein the method is utilized for regulating cardiac arrhythmia.

34. (Currently Amended) ~~The~~ A method of ~~claim 23,~~ modifying the electrophysiological function of an excitable tissue region of an individual, the method comprising:

(a) providing cells expressing an exogenous polypeptide forming a functional ion channel or transporter; and

(b) implanting said cells into the excitable tissue region, such that each implanted cell forms:

(i) gap junctions with at least one cell of the excitable tissue region; and

(ii) a functional ion channel or transporter;

thereby modifying the electrophysiological function of the excitable tissue region,

wherein the method is utilized for regulating secretion of endogenous factors from an organ including the excitable tissue region of the individual.

35. (Currently Amended) ~~The~~ A method ~~of claim 23,~~ of modifying the electrophysiological function of an excitable tissue region of an individual, the method comprising:

(a) providing cells expressing an exogenous polypeptide forming a functional ion channel or transporter; and

(b) implanting said cells into the excitable tissue region, such that each implanted cell forms:

(i) gap junctions with at least one cell of the excitable tissue region; and

(ii) a functional ion channel or transporter;

thereby modifying the electrophysiological function of the excitable tissue region,

wherein the method is utilized for regulating neuronal discharge.

36-39. (Canceled).

40. (New) The method of claim 23, wherein the method is utilized for regulating cardiac arrhythmia.

41. (New) The method of claim 23, wherein the method is utilized for regulating secretion of endogenous factors from an organ including the excitable tissue region of the individual.

42. (New) The method of claim 23, wherein the method is utilized for regulating neuronal discharge.

43. (New) The method of claim 28, wherein said ion channel is selected from the group consisting of a sodium ion channel, a potassium ion channel, a calcium ion channel and a chloride ion channel.

44. (New) The method of claim 28, wherein each implanted cell forms said functional ion channel or transporter following induction.

45. (New) The method of claim 28, wherein the excitable tissue region forms a part of an organ selected from the group consisting of a heart, a pancreas, a kidney, a brain, and a liver.

46. (New) The method of claim 28, wherein the method is utilized for regulating cardiac arrhythmia.

47. (New) The method of claim 28, wherein the method is utilized for regulating secretion of endogenous factors from an organ including the excitable tissue region of the individual.

48. (New) The method of claim 28, wherein the method is utilized for regulating neuronal discharge.

49. (New) The method of claim 29, wherein said ion channel is selected from the group consisting of a sodium ion channel, a potassium ion channel, a calcium ion channel and a chloride ion channel.

50. (New) The method of claim 29, wherein each implanted cell forms said functional ion channel or transporter following induction.

51. (New) The method of claim 29, wherein the excitable tissue region forms a part of an organ selected from the group consisting of a heart, a pancreas, a kidney, a brain, and a liver.

52. (New) The method of claim 29, wherein the method is utilized for regulating cardiac arrhythmia.

53. (New) The method of claim 29, wherein the method is utilized for regulating secretion of endogenous factors from an organ including the excitable tissue region of the individual.

54. (New) The method of claim 29, wherein the method is utilized for regulating neuronal discharge.

55. (New) The method of claim 33, wherein said ion channel is selected from the group consisting of a sodium ion channel, a potassium ion channel, a calcium ion channel and a chloride ion channel.

56. (New) The method of claim 33, wherein each implanted cell forms said functional ion channel or transporter following induction.

57. (New) The method of claim 34, wherein said ion channel is selected from the group consisting of a sodium ion channel, a potassium ion channel, a calcium ion channel and a chloride ion channel.

58. (New) The method of claim 34, wherein each implanted cell forms said functional ion channel or transporter following induction.

59. (New) The method of claim 35, wherein said ion channel is selected from the group consisting of a sodium ion channel, a potassium ion channel, a calcium ion channel and a chloride ion channel.

60. (New) The method of claim 35, wherein each implanted cell forms said functional ion channel or transporter following induction.